

Afrotropical Asilidae (Diptera) 29. A review of the genus *Saropogon* Loew, 1847 (Dasypogoninae)

by

Jason G. H. Londt

(Natal Museum, P. Bag 9070, Pietermaritzburg, South Africa)

ABSTRACT

The afrotropical species of *Saropogon* Loew are reviewed, with eight species recorded. Four of the five previously known species are redescribed (material of the fifth being unavailable for study). Three species are described as new: *S. greatheadi* (from Eritrea), *S. kenyensis* (from Kenya) and *S. zinidi* (from Kenya and Tanzania). A key to the species is provided. The need for a complete review of the palaearctic fauna is expressed, as this could resolve a number of taxonomic problems still relating to the afrotropical taxa.

INTRODUCTION AND HISTORICAL BACKGROUND

The Dasypogoninae, characterised by the presence of a spur at the apex of the prothoracic tibiae, are generally poorly represented in the afrotropics; only three genera have been recorded – *Caroncoma* Londt, 1980, *Pegesimallus* Loew, 1858, and *Saropogon* Loew, 1847. While *Caroncoma* (1 species) and *Pegesimallus* (44 species) were reviewed by Londt (1980), afrotropical *Saropogon* remain poorly understood.

Saropogon Loew is one of a few asilid genera believed to have an almost cosmopolitan distribution. The major Diptera catalogues reveal the following statistics:

Afrotropical	5 spp. (Oldroyd 1980)
Australasian	13 spp. (Daniels 1989)
Neotropical	11 spp. (Martin & Papavero 1970)
North American (Nearctic)	16 spp. (Martin & Wilcox 1965)
Oriental	6 spp. (Oldroyd 1975)
Palaearctic	66 spp. (Lehr 1988)

Although a comprehensive study of all the taxa is highly desirable, this task is not within my present competence. I will, therefore, confine my attention to species which are known to occur within the Afrotropical Region (see Afrotropical Diptera Catalogue listing). As the afrotropical species of *Saropogon* appear to be clustered largely in the north-eastern parts of the region, adjacent to elements of the extensive palaearctic fauna, it is important to be familiar with taxa which might occur in both the north-eastern afrotropics and adjacent southern Arabian states. Unfortunately, only two major works cover such areas; the somewhat dated, but excellent work of Efflatoun (1937) on the Egyptian fauna, and the more recent monographic study of the Palestinian fauna by Theodor (1980).

The limited historical background to afrotropical *Saropogon* can be summarised as follows:

- Loew (1851) – described *Dasypogon* (*Saropogon*) *melampyus* on a single Syrian specimen. The species has since been shown to have a wide distribution in the afrotropics.
- Wulp (1899) – recorded *S. melampyus* and described three new species, *incisuratus*, *pulverulentus* and *rubriventris*, from South Yemen.
- Efflatoun (1937) – in his review of the Egyptian fauna described *S. elbaiensis* from Sudan.
- Hull (1962) – provided a good generic redescription and a list of all the species known to him. While he listed *S. elbaiensis*, and *rubriventris* as valid afrotropical species, he considered *pulverulentus* a synonym of *alternatus* Loew and *incisuratus* a subspecies of *eucerus* (Loew), listing these two taxa together with *melampyus* under the palaearctic species. Hull also listed ‘? *tragicus* Wiedemann, 1828’ as a possible afrotropical taxon.
- Oldroyd (1963) – included *Saropogon* in a key to the tribes and genera of African Asilidae.
- Oldroyd (1980) – catalogued five afrotropical species – *elbaiensis*, *incisuratus*, *melampyus*, *pulverulentus* and *rubriventris*.
- Lehr (1988) – catalogued palaearctic species and listed afrotropical records for *S. elbaiensis*, *melampyus* and *vestitus* (Wiedemann).

This paper covers all species recorded from the Afrotropical Region except for ‘? *tragicus* Wiedemann, 1828’ as listed by Hull (1962) and *vestitus* as listed by Lehr (1988). Wiedemann described *tragicus* in *Dasypogon* and, according to Oldroyd (1980) who listed the species under ‘Unplaced Dasypogoninae’, his specimen(s) were from South Africa. While I have not seen Wiedemann’s material, the species is unlikely to be a *Saropogon* as the genus is not known to occur south of Tanzania. As far as *vestitus* is concerned, I have excluded it from this paper as I have not seen positively identifiable material from the afrotropics. The possibility that *rubriventris* is a synonym of *vestitus* is, however, discussed.

MATERIAL AND METHODS

Every effort was made to locate and examine all type specimens and all available afrotropical material. Seventy two specimens were accumulated. Institutions which provided specimens for study are listed below, together with the names of the people who kindly assisted me.

- | | | |
|------|---|--|
| BMNH | – | The Natural History Museum, London, U.K. (J. Chainey) |
| CASC | – | California Academy of Sciences, San Francisco, U.S.A. (N. D. Penny) |
| ISNB | – | Institut Royal des Sciences Naturelles de Belgique, Brussels, Belgium (P. Grootaert) |
| MRAC | – | Musée Royal de l’Afrique Centrale, Tervuren, Belgium (E. De Coninck) |
| NMKE | – | National Museum of Kenya, Nairobi, Kenya (M. de Meyer) |

- NMSA – Natal Museum, Pietermaritzburg, South Africa
 OXUM – Hope Entomological Collections, University Museum, Oxford,
 U. K. (Dr J. McGavin)
 WAAU – Wageningen Agricultural University, Wageningen, The Netherlands
 (R. Zwart)

In recording label data a standard format is used, where information contained on each label is demarcated by use of single inverted commas, each line of data being separated by a slash (/). Square brackets are used to indicate additional information not found on labels.

In all instances specimens were dry-mounted on pins. Drawings of genitalia were prepared after first removing the terminal segments of the abdomen and clearing them in hot potassium hydroxide. Genitalia so treated were stored temporarily in small plastic vials, containing a mixture of ethanol and glycerine, until completion of the study when they were sealed in polyethylene tubes containing a mixture of glycerine and ethanol, and attached to the specimen pins.

The following notes are useful in interpreting descriptive passages: antennal setae are confined mainly to scape and pedicel, but there are also setae on the posterodorsal parts of the flagellum; widths of eye and face are measured anteriorly at the level of maximum head width; the width of eye : width of face ratio is calculated by dividing the eye width by the face width (a value greater than one indicating that the face is narrower than the eye); abbreviations used for mesonotal macrosetae are npl = notopleurals, spal = supra-alars, pal = postalars, dc = dorsocentrals (acrostichal macrosetae are absent or so poorly developed as to blend in with general fine setation); wing length is measured from humeral crossvein to tip, breadth at broadest level; proportional lengths of antennal segments are relative to the scape which is taken as 1. Terminology generally follows McAlpine (1981).

TAXONOMY

Saropogon Loew

Saropogon Loew, 1847: 439 (as subgenus of *Dasygogon*). Type-species: *Dasygogon luctuosus* Wiedemann, 1820, by designation of Coquillett (1910: 603).

Sarapogon: Williston, 1889: 74, incorrect spelling.

Hull (1962) provided an excellent and full redescription of the genus. The following keys will separate the afrotropical taxa.

Key to afrotropical genera of Dasygogoninae

- 1 Prothoracic tibial spur stout and associated with a well-developed tarsal process; scutellum lacking marginal macrosetae; ♂ hypandrium fused with epandrium to form a continuous ring2
- Prothoracic tibial spur slender, sigmoid, and not associated with a tarsal process, but at most a group of stout, peg-like, black tarsal setae; scutellum with a pair of well-developed marginal macrosetae; ♂ hypandrium not fused with epandrium, but separated from it by a suture.....**Saropogon** Loew
- 2 Ocellar tubercle prominent; occiput usually with one pair of vertical setae not borne on a prominence; postpronotal lobe (= humeral callus) lacking

- macrosetae; mesonotum lacking dorsocentral macrosetae anterior to transverse suture **Pegesimallus** Loew
- Ocellar tubercle not prominent; occiput with 2–3 pairs of vertical setae borne on a prominence immediately behind ocelli; postpronotal lobe with 1–2 stout macrosetae; mesonotum with well-developed dorsocentral macrosetae anterior to transverse suture **Caroncoma** Londt

Key to afrotropical species of *Saropogon*

(excluding *elbaiensis* Efflatoun and *vestitus* (Wiedemann))

- 1 Antennal flagellum plus microsegment more than 3 times the combined lengths of scape and pedicel; pedicel approximately half the length of scape **greatheadii** sp. n.
- Antennal flagellum plus microsegment less than twice the combined lengths of scape and pedicel; pedicel and scape subequal in length 2
- 2 Abdominal terga T1–3 uniformly blackish 3
- Abdominal terga T1–3 yellow-brown with at most some dark red-brown parts 4
- 3 Terga T4–6 blackish, like T1–3; wing membrane uniformly transparent, and with cell m_3 open at margin; a small species (wing length about 5 mm) **incisuratus** Wulp
- Terga T4–6 yellow-brown, contrasting with blackish T1–3; wing membrane brown-shaded (due to presence of microtrichia) along major veins, and with cell m_3 closed and stalked; a big species (wing length about 9 mm) **zinidi** sp. n.
- 4 Wings yellow-brown (due to a combination of staining and the presence of microtrichia over entire membrane) 5
- Wings transparent (due to the complete lack of staining and the absence of microtrichia over most of the membrane) 6
- 5 Dark red-brown markings of abdomen located predominantly on anterior segments; face gold pruinose in both sexes; cell m_3 usually closed **melampygius** Loew
- Dark red-brown markings of abdomen located predominantly on posterior segments; ♂ face dark red-brown pruinose, ♀ face gold pruinose; cell m_3 usually open **kenyensis** sp. n.
- 6 Cell m_3 closed and stalked **pulverulentus** Wulp
- Cell m_3 open at margin **rubriventris** Wulp

Saropogon elbaiensis Efflatoun, 1937

Saropogon elbaiensis Efflatoun, 1937: 394–7 figs 309–310 head, 311–312 ♂ gen., Plate viii fig. 80 whole ♂; Hull, 1962: 278; Oldroyd, 1980: 367.

This species was described from a short series collected during April and May 1929 at Gebel Elba (22°11'N:36°21'E) by M. Tewfik (Efflatoun 1937). While Efflatoun included the species in a review of Egyptian asilids the locality is in the north-eastern part of Sudan, close to the Egyptian border, and should therefore be included in any study of the afrotropical fauna. Both Hull (1962) and Oldroyd (1980)

correctly dealt with the species in this way. Unfortunately the whereabouts of the type specimens is not known and so they could not be studied.

In describing *elbaiensis* Efflatoun remarked that it was 'closely allied to *S. alternatus* Lw., from British Baluchistan (Quetta, 6000 ft.) but is easily distinguished from it by antennae, wing-venation and the design on the abdomen.' According to Lehr (1988), *S. alternatus* has been recorded from 'USSR: SMA' (Soviet Middle Asia) and Iran – some distance from Sudan.

I have studied a defective specimen (lacking terminalia) from BMNH which is labelled 'Niboi / 7.vi.22'; 'Kenya Colony / Northern Frontier Dist. / Juba River. / Dr. J. O. Beven'; '*Saropogon* / sp ? / near *alternatus*'; 'Pres. by / Imp. Inst. Ent. / Brit. Mus. / 1931–138'. Kenyan gazetteers available to me do not list Juba River. The only Juba I found is in Sudan (4°50'N:31°35'E) and so it seems likely that this specimen may belong to *elbaiensis*. If this is true the specimen must be a female as the abdomen is very largely red-brown in colour (the male's being almost entirely blackish). Although this damaged specimen agrees in most respects with the description given by Efflatoun I am not entirely confident of the identification. For the present I exclude this species from my key due to the absence of good comparative material.

***Saropogon greatheadi* sp. n.**

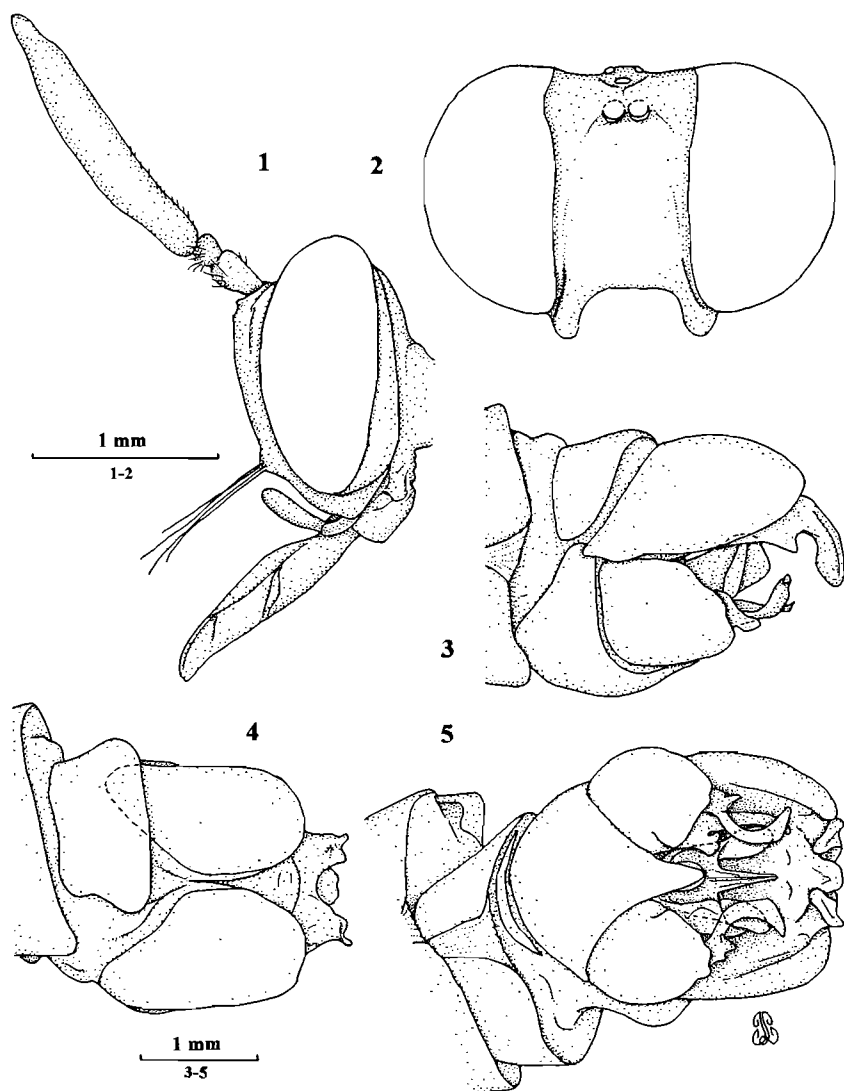
Figs 1–5

Etymology: Named for Dr David Greathead, whose collecting activities in north-east Africa added a number of interesting specimens to the collections of the British Museum, London.

Description: Based on holotype ♂.

Head (Figs 1–2): Face brown-yellow, gold pruinose; frons, vertex and occiput dark red-brown to black, silver pruinose except for a transverse band across vertex, including most of ocellarium, which is shiny apruinose. Setae of frons, vertex and occiput very short and whitish. Antenna with orange scape and pedicel, dark red-brown flagellum and microsegment; setae mostly yellow, a few black; proportional lengths of segments – 1 : 0.5 : 6.0; pedicel *ca* half length of scape, microsegment not clearly differentiated from flagellum, subapical pit-enclosed seta present (pit far more elongate than in other species). Width of eye : width of face ratio 0.9 : 1 (i.e. face slightly wider than eye). Mystax brown-yellow and black (3 setae only); composed of 9 setae arranged in a single row along lower facial margin. Palpus dark brown. Proboscis dark red-brown with paler transverse stripe at mid-length, very gently downcurved.

Thorax: Mesonotum orange-brown with 3 dark red-brown longitudinal areas, the central one reaching to anterior margin; silver pruinose especially on lateral margins. Macrosetae brown-yellow: 3 npl; 3 spal; 2 pal; *ca.* 4 pairs dc postsuturally; pronotal lobes with 2 brown-yellow macrosetae. Scutellum brown-yellow, 2 brown-yellow marginal macrosetae; disc asetose, silver pruinose. Pleura dark red-brown, gold-silver pruinose; katatergite with *ca.* 20 scattered pale yellow setae. Wing: 12.4 x 4.7 mm; cell *m*₃ closed and stalked, cup closed; membrane unstained, transparent; microtrichia



Figs 1–5. *Saropogon greatheadi* sp. n., holotype ♂ (Massawa). 1–2. Head. 1. Lateral. 2. Anterior. 3–5. ♂ genitalia. 3. Lateral. 4. Dorsal. 5. Ventral. Scale lines equal 1 mm.

confined to wing margins and tip as well as margins of major veins, giving these areas a grey appearance. Halter: Brown-red. Legs: Brown-yellow, tarsi slightly darker; setae yellow and black (macrosetae mostly black).

Abdomen: Brown; macrosetae pale yellow, confined to lateral parts of T1. Genitalia (Figs 3–5): not rotated; proctiger well developed and downwardly directed distally; hypandrium tapering to rounded point distally and with poorly developed membranous, distal lobe (Fig. 5); phallus moderately developed with wing-like projections laterally (Fig. 5).

Variation: The paratype ♂ is teneral, somewhat distorted, greasy and lacking the terminal segments of the antennae. The genitalia and other main diagnostic features agree well with the holotype. The ♀ is unknown.

Material examined: ERITREA: 1 ♂ **holotype**, '15 ml N Massawa [= Mits'iwa – 15°36'N:39°28'E]/Eritrea / 8/8/64' (BMNH); 1 ♂ **paratype**, 'Eritrea: / near / Massawa / 1.iv.1961 / D. J. Greathead' (BMNH).

The holotype locality label is hand-written in pencil and was probably intended as a field label. Greathead (*pers. comm.*) suggests that he collected the holotype as he visited the locality in both 1961 and 1964. He describes Massawa and the collecting site as follows 'Seaport for Eritrea and northern Ethiopia on salt marsh. Collecting site inland of marsh on gravel plain with sparse grass clumps and few flowering shrublets'.

Saropogon incisuratus Wulp, 1899

Figs 6–10

Saropogon incisuratus Wulp, 1899: 82 Pl. II fig. 1 (wing).

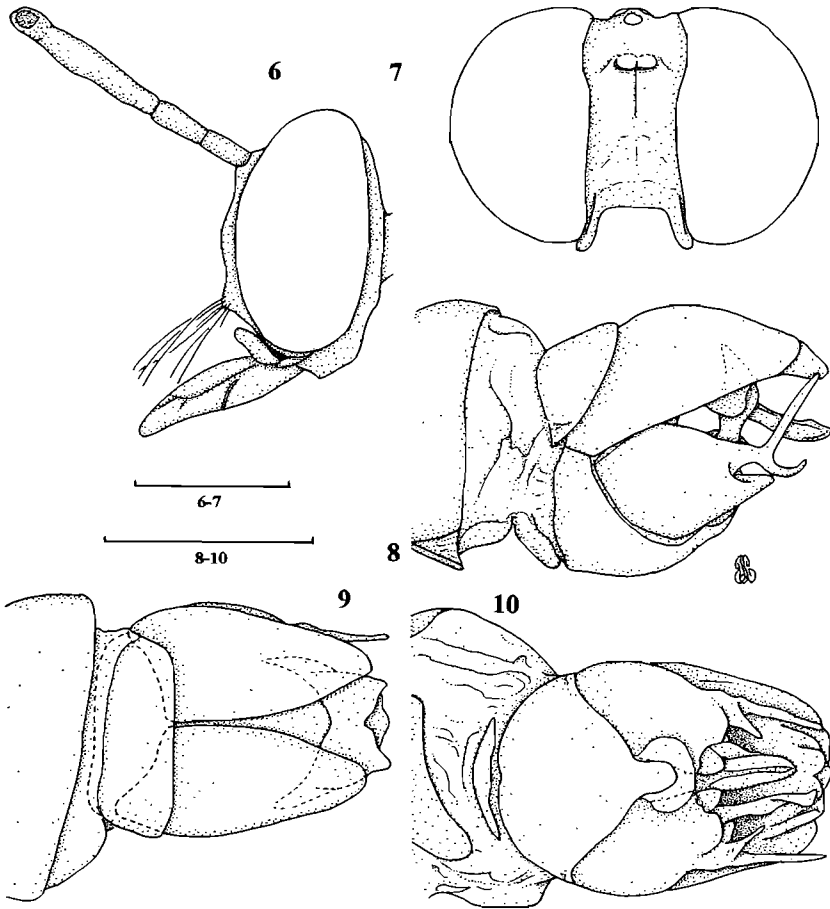
Saropogon eucerus incisuratus; Hull, 1962: 278.

Wulp (1899) described this species on 'five male specimens from Lahej' (13°01'N:44°54'E) collected by Col. J. W. Yerbury in South Yemen. The OXUM has sent me four males (listed below); the whereabouts of the fifth specimen is not known. Wulp (1899) did not designate a holotype so all his specimens must be considered syntypes. I here designate the male labelled as Type Dip: 182 1/4 (accession number 7677) as lectotype and consider the other OXUM specimens to be paralectotypes. Wulp did not comment on the species' relationships with other taxa.

Redescription: Based on lectotype ♂.

Head (Figs 6–7): Face brown-yellow, silver-gold pruinose; frons, vertex and occiput dark red-brown to black, silver-gold pruinose except for a transverse band across vertex, including most of ocellarium, which is shiny apruinose. Setae of frons and vertex black, of occiput black and whitish. Antenna brown-yellow, slightly darker distally; setae dark red-brown; proportional lengths of segments – 1 : 2.0 : 5.5 : 0.9; microsegment with subapical pit-enclosed seta. Width of eye : width of face ratio 1.6 : 1. Mystax pale yellow-white; composed of *ca.* 12 setae and confined to lower facial margin. Palpus dark red-brown. Proboscis dark red-brown, straight.

Thorax: Mesonotum dark red-brown, postpronotal and postalar lobes brown; fine silver pruinose, especially along lateral margins. Macrosetae pale yellow-white: 2 npl; 2 spal; 2 pal; *ca.* 2 pairs dc postsuturally. Scutellum dark red-brown, lateral parts slightly paler, with 2 pale yellow-white marginal macrosetae; disc asetose, silver-gold pruinose. Pleura dark red-brown, silver-gold pruinose; katatergite with *ca.* 12 scattered pale yellowish setae. Coxae as pleura but red-brown pruinose. Wing: 4.8 x 1.7 mm; cells m_3 and cup open; membrane unstained, transparent; microtrichia confined to wing margins and tip giving these areas a grey appearance. Halter: Pale brown-yellow. Legs: Pale brown-yellow except for tarsi which are slightly darker, metathoracic femur which has a large dark red-brown patch mid-dorsally extending onto anterior and posterior surfaces, and trochanters which are dark red-brown like coxae; setae yellowish and dark red-brown, the latter mostly on tarsi.



Figs 6–10. *Saropogon incisuratus* Wulp. 6–7. Head, lectotype ♂ (Lahej). 6. Lateral. 7. Anterior. 8–10. ♂ genitalia, paralectotype ♂ (Lahej). 8. Lateral. 9. Dorsal. 10. Ventral. Scale lines equal 1 mm.

Abdomen: Dark red-brown to black, terminalia brown-orange, hind margins of T2-4 silver pruinose; macrosetae pale yellow-white, confined to lateral parts of T1, setation white. Genitalia (Figs 8–10): rotated *ca.* 90° clockwise; gonocoxite with elaborate branched distal projections; hypandrium with well-developed membranous, distal lobe (Fig. 10); phallus well developed and projecting distally to be approximately level with proctiger (Fig. 8).

Variation: Paralectotypes concur remarkably with the lectotype. The ♀ of this species has not been identified (although it is possible that the unique ♀ of *rubriventris* may be conspecific – see discussion below).

Material examined: Types (OXUM): SOUTH YEMEN: 1 ♂ **lectotype**, 'Type / v.d. Wulp / Trans. Ent. Soc. / 1899, page 82 / pl. ii, fig. 1'; 'S. W. Arabia / 15 miles N. W. of / Aden, Lahej / Capt. Mar. 28.95 [1895] by / J. W. Yerbury'; '1899 / 7677'; 'Type Dip: 182 1/4 / *Saropogon / incisuratus / van der Wulp / Hope Dept. Oxford*'. 3 ♂ **paralectotypes** same data but Mar. 10.95, 1899/7681 (Type 182 2/4), Mar 5.95,

1899/7680 (Type 182 3/4), Mar. 17.95, 1899/7678 (Type 182 4/4).

Relationships: While Hull (1962) considered *incisuratus* to be a subspecies of *eucerus* (Loew), this combination was not accepted by Oldroyd (1980). A decision on this matter can only be made after taxonomic review of the palaearctic fauna. For the present *incisuratus* appears to be a distinctive species within the afrotropical fauna. The open cell m_3 suggests affinity with *rubriventris* (see below) and possibly *kenyensis*.

***Saropogon kenyensis* sp. n.**

Figs 11–15

Etymology: Named after Kenya, from which all known material has been collected.

Description: Based on holotype ♂.

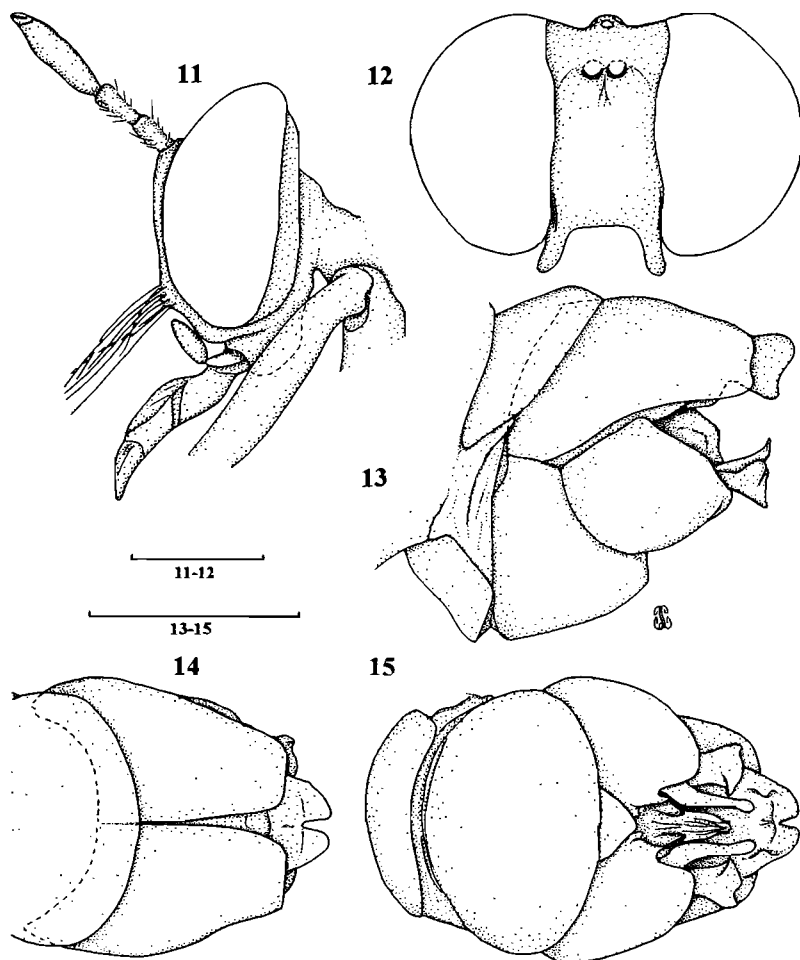
Head (Figs 11–12): Entirely dark red-brown to black; face brown-red pruinose, frons, vertex and occiput silver pruinose except for most of ocellarium, which is shiny apruinose. Setae of frons, vertex and occiput white. Antenna orange; setae pale yellow; proportional lengths of segments – 1 : 1.2 : 2.7 : 0.2; microsegment with subapical pit-enclosed seta. Width of eye : width of face ratio 1.3 : 1 (i.e. face somewhat narrower than eye). Mystax pale yellow-white; composed of *ca.* 60 setae arranged in 3 rows along lower facial margin. Palpus dark red-brown. Proboscis dark red-brown, gently downcurved distally.

Thorax: Mesonotum dark red-brown, postpronotal and postalar lobes brown-orange; silver pruinose especially on lateral margins. Macrosetae yellow: 2 npl; 2 spal; 2 pal; *ca.* 2 pairs dc postsuturally; pronotal lobes equipped with 4 yellow macrosetae. Scutellum dark red-brown with orange border, 2 yellow marginal macrosetae; disc asetose, silver pruinose. Pleura dark red-brown, gold-silver pruinose; katatergite with *ca.* 12 scattered pale yellow setae. Wing: 6.9 x 2.6 mm; cell m_3 open, cup closed at margin; membrane yellow stained, opaque; microtrichia cover entire wing except for alula and base of anal cell (wings have an overall yellow-brown appearance). Halter: Pale yellow. Legs: Pale brown-yellow, anteroproximal parts of pro- and mesothoracic femora red-brown; macrosetae mostly yellow, but some red-brown.

Abdomen: Brown-orange with dark red-brown areas as follows – entire T1 except for small lateral areas, anterodistal half of T2, anterodistal one-third of T3, lateral spots on T2–5 (terminal segments cleared for genital illustration); macrosetae pale yellow, confined to lateral parts of T1. Genitalia (Figs 13–15): not rotated; hypandrium rounded distally, with flat membranous projection between gonocoxites (Fig. 15); phallus well developed, downturned distally (Fig. 13).

Variation: The males listed below agree well with the holotype. The abdomen may be more extensively dark red-brown; the anterior faces of the metathoracic femora may be partly dark red-brown; cell cup may be narrowly open at the wing margin. There appears to be some sexual dimorphism as the single female paratype has a bright gold pruinose face and mesonotum.

Material examined: KENYA: 1 ♂ **holotype**, 'Kenya 6 km S Kapedo / Hot waterfall 760m / 01°08'N:36°06'E / 2–3.vi.1980 B. Lamoral / Malaise trap.'; '*Saropogon* ♂ / ?



Figs 11–15. *Saropogon kenyensis* sp. n. paratype ♂ (Tsavo) 11–12. Head. 11. Lateral. 12. Anterior. 13–15. ♂ genitalia. 13. Lateral. 14. Dorsal. 15. Ventral. Scale lines equal 1 mm.

melanopygus Lw. / det. J.G.H. Londt, 1992' (NMSA); 1 ♂ **paratype**, 'Kenya / near Archer's / Post [0°39'N:37°41'E] / 20.ii.1964 / D. J. Greathead' (BMNH); 2 ♂ 1 ♀ **paratypes**, 'Kenya: Tsavo Nat. / Park. Kitani Lodge [3°00'S:37°59'E] / 2600' 6.xii.1969 / M. E. Irwin & / E. S. Ross' (CASC).

Biological notes: Greathead (*pers. comm.*) describes Archer's Post as 'Waterhole on dirt road to Ethiopia. Open sandy savanna with scattered *Acacia* spp. and low shrubs'.

Relationships: The species cannot be confused with any other afrotropical species. *S. kenyensis* is similar to *melanopygus* in that the wings are brown-stained and entirely covered with microtrichia, but is otherwise easily separated from that taxon. It appears that the open condition of cell m_3 is a stable character state shared only with *incisuratus* and *rubriventris*, species otherwise differing from *kenyensis*.

Saropogon melampygi (Loew, 1851)

Figs 16–20

Dasygogon (*Saropogon*) *melampygi* Loew, 1851: 10.
melanopygi. Incorrect subsequent spelling.

In his original description, Loew (1851) makes no mention of the material upon which his taxon was based. The likely holotype, housed in the ZMHB, does not bear Loew's name, the hand-written identification label merely having the letter 'm' where one would expect the author's name. A survey of other major European institutions failed to produce any other material and so I accept the ZMHB specimen as the holotype of *melampygi*.

Redescription: Based on holotype ♀.

Head (Figs 16–17): Face brown-yellow, gold pruinose; frons, vertex and occiput dark red-brown (except for a small yellow-brown subtriangular area behind ocellarium), silver pruinose except for a transverse band across vertex, including most of ocellarium, which is shiny apruinose. Setae of frons and vertex black, of occiput yellowish and dark red-brown. Antenna brown-yellow, distal nine-tenths of flagellum and microsegment dark brown; setae mostly dark red-brown, a few yellow; proportional lengths of segments – 1 : 0.9 : 2.9; 0.3; microsegment with subapical pit-enclosed seta. Width of eye : width of face ratio 1.3 : 1. Mystax composed of 11 setae, yellowish except for 2 black ones at lateral extremities; confined to a single row on lower facial margin. Palpus dark red-brown. Proboscis dark red-brown, straight.

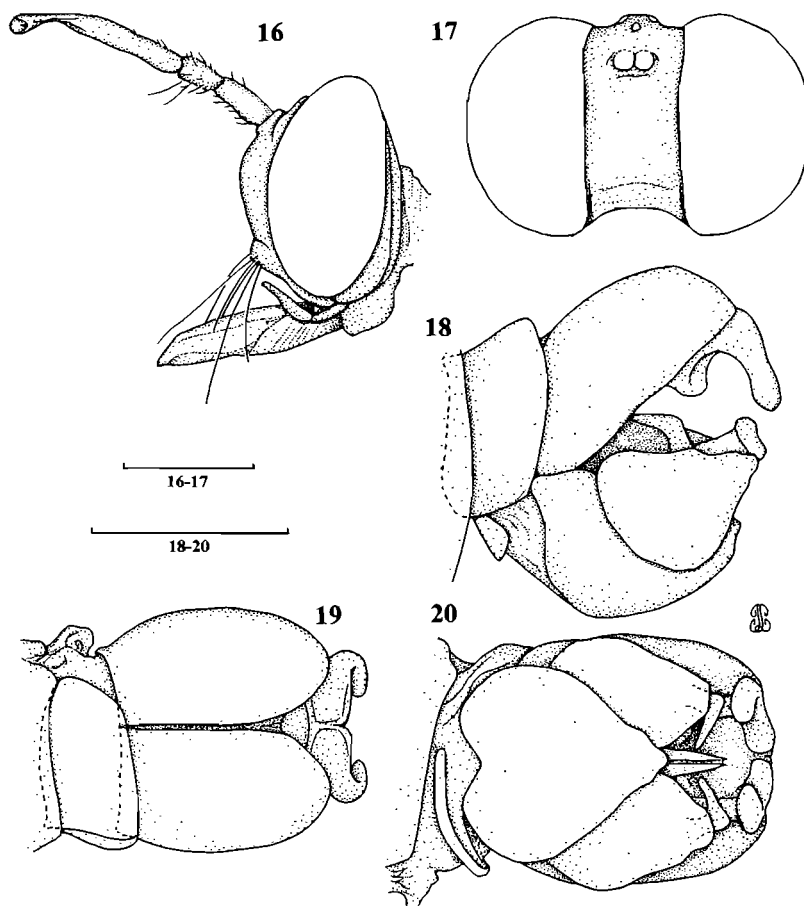
Thorax: Mesonotum largely dark red-brown, postpronotal and postalar lobes as well as posterior part of mesonotum brown-orange; fine silver pruinose especially along lateral margins. Macrosetae: 3 yellow-orange npl; 2–3 yellow-orange spal (1 black); 2 yellow-orange pal; ca. 4 pairs black dc postsuturally. Scutellum brown-orange, with 2 yellow marginal macrosetae; disc asetose, fine silver pruinose. Pleura dark red-brown to black, silver pruinose; katatergite with ca. 8 scattered fine yellowish setae. Coxae as pleura. Wing: 6.0 x 2.3 mm; cells m₁ and cup closed at margin; membrane yellow-brown stained, mostly opaque; microtrichia covering entire surface except alula and proximal part of anal lobe. Halter: Brown-yellow. Legs: Brown-yellow; setae yellow and dark red-brown, most microsetae dark red-brown.

Abdomen: Dark yellow-brown and dark red-brown – T1–2 yellow-brown, T3–5 yellow-brown with dark red-brown anterolateral parts, T6-terminalia dark red-brown to black; macrosetae yellowish, confined to lateral parts of T1.

Variation: Other material listed appears conspecific and displays very limited variation except for slight colour differences. ♂ genitalia (Senegal specimen) (Figs 18–20): black; rotated ca. 90° clockwise; proctiger characteristically heavy and downturned distally; hypandrium tapering distally and lacking obvious membranous terminal lobe (Fig. 20); phallus well developed (Fig. 20).

Material examined: Type: SYRIA: 1 ♀ **holotype**, 'Syria / Chrenb.'; '*Saropogon / melampygi* / m'; 'Typus [orange]' (ZMHB).

Other (Afrotropical): ERITREA: 1 ♀ 'Eritrea: / Jebbel [= Jebel] / Geddem



Figs 16–20. *Saropogon melampyrgus* Loew, ♂ (Richard Toll). 16–17. Head. 16. Lateral. 17. Anterior. 18–20. ♂ genitalia. 18. Lateral. 19. Dorsal. 20. Ventral. Scale lines equal 1 mm.

[15°20'N:39°35'E] / 9.ii.1956 / D. J. Greathead' (BMNH); 1 ♀ 'Eritrea: / Jebel / Geddem / 22.ii.56 / D. J. Greathead' (BMNH); 1 ♂ 'Eritrea: / Sheb [15°50'N:39°03'E] / 10.ii.1956 / D. J. Greathead' (BMNH); 1 ♂ 1 ♀ 'Eritrea: / Sheb / on / Heliotropis / 17.ii.1956 / D. J. Greathead' (BMNH); 3 ♂ 'Eritrea: / Arkiko [= Hargigo – 15°32'N:39°27'E] / 14.iii.1961 / D. J. Greathead' (BMNH); 2 ♂ 1 ♀ 'Eritrea: / Arkiko / 1.iv.1961 / D. J. Greathead' (BMNH). MALI: 1 ♀ N. Mali, 350m / Adrar [Adrar des Infora region – ca. 20°N:2°E] / 20.x–2.xi.81 / G. Popov' (BMNH). MAURITANIA: 1 ♂ 2 ♀ 'Mauritania / Aounel Atrous [Ayoûn el 'Atroûs – 16°38'N:9°37'W] / 10.ix.61 / G. B. Popov' (BMNH). NIGER: 1 ♂ 'Niger: Gaya [11°52'N:3°28'E] / viii.75 / G. B. Popov' (BMNH). SENEGAL: 3 ♂ 1 ♀ 'Senegal 25–35 km / sud de Richard Toll [16°28'N:15°41'W] / piege malaise / 29.9.1989 [& 13.9.1989, 31.8.1989, 18.8.1989] / leg. H. v.d. Valk c.s.'; '*Saropogon* ♂ / *longicornis* (Macq. 1839) / Det. J.G.H. Londt' (NMSA); 10 ♂ 3 ♀ same date but 18.iii., 25 & 31.viii, 2, 29 & 30.ix.89 (WAAU). SOUTH YEMEN: 1 ♀ 'Arabia: E. A. P. / Waddi /

Jardan [15°58'N:46°48'E for Ayadh – see below] / 7.vi.1956 / D. J. Greathead' (BMNH). SUDAN: 1 ♀ 'Sudan / El Fau [14°09'N:34°20'E] / (Kassala P.) [Province] / 13–17.x.1978 / K. Guichard' (BMNH).

Other (Palearctic): EGYPT: 1 ♂ 'Ezbet-Naghl [?] / 12.6.21'; 'Coll. Efflatoun / Egypt'; 'C. H. Curran / Collection / Acc. 31144'; '*Saropogon / melanopygus* Lw. / Det Efflatoun' (CASC).

Note: Wulp (1899) records *melampygus* on 'several specimens of both sexes', collected by Col. Yerbury from Lahej (13°01'N:44°54'E) and Shaik Othman (Shaikh 'Othman – 12°53'N:45°01'E) in South Yemen. He commented on variation in the species, drawing special attention to coloration of the antennae, mystax and abdomen. His material, which I have not seen, is presumably in OXUM.

Biological notes: Greathead (*pers. comm.*) has provided me with the following descriptions of localities at which he collected this species:

Jebel Geddem – 'Prominent volcanic mountain on coast at southern end of bay on south side of Massawa. I collected on the lower slopes where dense *Acacia* spp. bush grows on the outwash of silt derived from lava'.

Sheb – 'Settlement by wadi at foot of escarpment, therefore relatively moist with scattered *Acacia* spp. and ephemeral vegetation after rain when collections were made'.

Arkiko – 'Large village by sea on bay south of Massawa. Open plain with heavily grazed short grassland. Scattered grazed *Acacia* spp. shrubs'.

Wadi Jordan – 'Runs past the settlement of Ayadh. Dry river bed with *Calotropis procera* and *Leptadenia pyrotechnica* (both Asclepiadaceae) on sand/gravel plain with the annual grass *Aristida plumosa* after rain. Scarcely rains, main source of moisture from underground water draining from mountains to south'.

These notes clearly indicate that *melampygus* is associated with *Acacia* savanna, a fact well supported by the distributional data available.

Relationships: A distinctive species, perhaps most closely similar to *kenyensis* (see above).

Saropogon pulverulentus Wulp, 1899

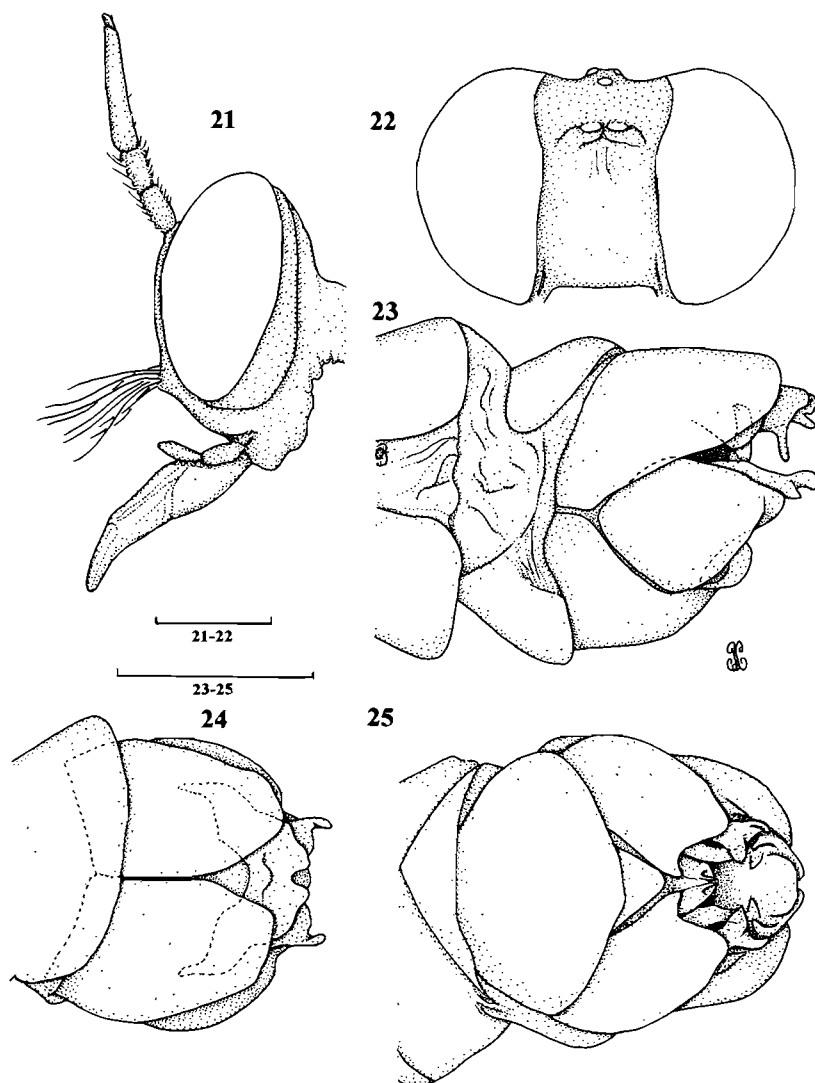
Figs 21–25

Saropogon pulverulentus Wulp, 1899: 83 Pl. II fig 2 (whole ♂).

Wulp (1899) described this species on 'several specimens of both sexes' collected by Col. Yerbury from Huswah across Aden harbour (Aden – 12°47'N:45°03'E) and Shaik Othman (Shaikh 'Othman – 12°53'N:45°01'E) in South Yemen. The OXUM has sent me two males, three females and one specimen without abdomen (listed below). I assume this to be the entire type series. Wulp (1899) did not designate a holotype, so all his specimens must be considered syntypes. I here designate the male labelled as Type Dip: 181 1/6 (accession number 7684) as lectotype and consider the other OXUM specimens to be paralectotypes.

Redescription: Based on lectotype ♂.

Head (Figs 21–22): Face probably brown-yellow but heavily gold pruinose effectively masking colour; frons, vertex and occiput dark red-brown to black, silver pruinose except for transverse band across vertex, including most of ocellarium, which is shiny apruinose. All setae pale whitish. Antenna pale brown-yellow; setae white; proportional lengths of segments – 1 : 1.4 : 3.2 : 0.3; microsegment with subapical pit-enclosed seta. Width of eye : width of face ratio 1.1 : 1. Mystax white; composed of *ca.* 30 setae arranged in 2–3 rows along lower facial margin. Palpus brown-yellow. Proboscis red-brown, slightly downcurved distally.



Figs 21–25. *Saropogon pulverulentus* Wulp. 21–22. Head, ♂ (Dhofar). 21. Lateral. 22. Anterior. 23–25. ♂ genitalia, paralectotype (Shaik Othman). 23. Lateral. 24. Dorsal. 25. Ventral. Scale lines equal 1 mm.

Thorax: Mesonotum dark red-brown, postpronotal and postalar lobes brown-yellow; strongly silver pruinose except postpronotal lobe which is gold pruinose. Macrosetae yellow-white: 2–3 npl; 3–4 spal; 2 pal; *ca.* 4 pairs dc postsuturally; pronotal lobes equipped with 4–5 macrosetae. Scutellum brown-orange; 4 yellow-white marginal macrosetae; disc asetose, gold pruinose. Pleura red-brown, strongly gold pruinose; katatergite with *ca.* 20 scattered yellow-white setae. Wing: 8.4 x 3.0 mm; cell m₃ closed and stalked, cup very narrowly open; membrane unstained, slightly milky opaque; microtrichia largely absent except for a few at tip and along margins. Halter: Dark brown. Legs: Pale brown-yellow; setae pale yellowish and dark red-brown, the latter mostly on tarsi.

Abdomen: Brown-orange except for anterior parts of T1–2 and anterolateral parts of T3–7 which are red-brown (extent progressively diminishing posteriorly); macrosetae pale yellow, confined to lateral parts of T1. Genitalia (Figs 23–25): not or barely rotated; proctiger with ventrally directed process (Fig. 23); hypandrium with membranous distal lobe (Fig. 25); phallus with small terminal penisfillum (Fig. 25).

Variation: Paralectotypes reasonably consistent with lectotype. Cell cup sometimes closed on wing margin; marginal scutellar macrosetae may be three in number; extent of red-brown coloration of abdomen may be greater. One specimen has dorsal parts of all femora slightly brownish.

Material examined: Types (OXUM): SOUTH YEMEN: 1 ♂ **lectotype**, 'Type / v.d. Wulp / Trans. Ent. Soc. / 1899, page 83 / pl. ii, fig. 2'; 'S. W. Arabia / 6 m. N. of Aden / Shaik Othman / Capt. Apr. 1.95 [1895] / & pres. 1899 by / J. W. Yerbury'; '1899 / 7684'; 'Type Dip: 181 1/6 / *Saropogon / pulverulentus* / van der Wulp / Hope Dept. Oxford'. 1 ♂ 3 ♀ **paralectotypes**, with same data but 1899/7688 (Type 181 2/6), 1899/7682 (Type 181 3/6), Apr. 5.95, 1899/7686 (Type 181 4/6), 1899/7683 (Type 181 5/6). 1 ? **paralectotype**, 'Type / v.d. Wulp / Trans. Ent. Soc. / 1899, page 83 / pl. ii, fig. 2'; 'S. W. Arabia / shore opposite / Aden, Huswah / Capt. Apr. 14.95 [1895] / & pres. 1899 by / J. W. Yerbury / MS by J.W.Y.'; '1899 / 7685'; 'Type Dip: 181 6/6 / *Saropogon / pulverulentus* / van der Wulp / Hope Dept. Oxford'.

Other: ERITREA: 1 ♀ 'Eritrea: / Wachiro [15°50'N:39°20'E] / 17.xii.1955 / D. J. Greathead' (BMNH); 1 ♀ 'Eritrea: / plain near / Karora [= Kerora – 17°42'N:38°22'E] / 22.xi.1955 / D. J. Greathead' (BMNH). OMAN: 2 ♂ 1 ♀ 'Dhofar [= Zufar] / Salalah s.l. [17°00'N:54°04'E] / 21.9.1977 / K. Guichard' (BMNH); 1 ♀ 'Dhofar / Raysut [16°56'N:54°00'E] / 7.x.77 / KG [K. Guichard]' (BMNH).

Relationships: Wulp compared this species with *S. vestitus* Wiedemann while Hull (1962) considered *pulverulentus* to be a synonym of *alternatus* Loew. The true position of the species will probably not be understood before a complete review of all palaearctic taxa has been undertaken. The species is, however, readily separable from all other afrotropical taxa.

Saropogon rubriventris Wulp, 1899

Figs 26–27

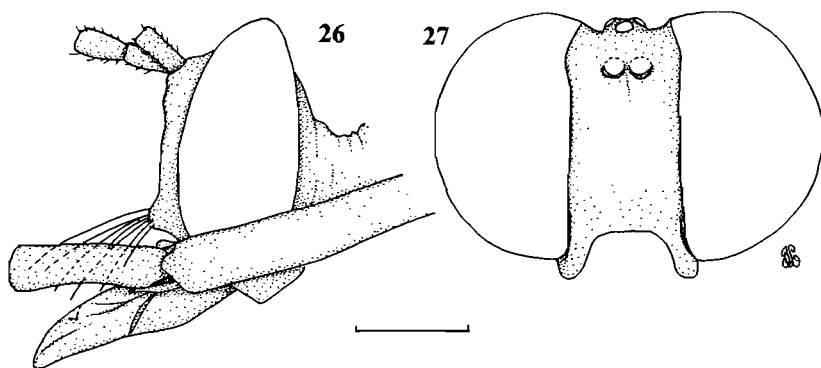
Saropogon rubriventris Wulp, 1899: 83.

Wulp (1899) described this species on 'a single female from Lahej' (13°01'N:

44°54'E) collected by Col. J. W. Yerbury in South Yemen. The OXUM has sent me this specimen (listed below), which must be considered the holotype.

Redescription: Based on holotype ♀.

Head (Figs 26–27): Face brown-yellow, gold pruinose; frons, vertex and occiput dark red-brown, gold pruinose except for transverse band across vertex, including most of ocellarium, which is shiny apruinose. Setae of vertex and frons black, occiput pale yellow. Antenna pale brown-yellow; setae black; proportional lengths of segments – 1 : 1.3 : terminal segments missing. Width of eye : width of face ratio 0.7 : 1. Mystax white; composed of *ca.* 25 setae arranged in 2 rows along lower facial margin. Palpus brown-yellow. Proboscis brown-yellow proximally, red-brown distally, straight.



Figs 26–27. *Saropogon rubriventris* Wulp. Head, holotype (Lahej). 26. Lateral. 27. Anterior. Scale line equals 1 mm.

Thorax: Mesonotum red-brown, darker mid-dorsally, postpronotal and postalar lobes brown; strongly gold pruinose. Macrosetae yellow-white: 2–3 npl; 3–4 spal; 2 pal; *ca.* 3–4 pairs dc postsuturally; pronotal lobes lacking macrosetae. Scutellum brown; 2 pale yellow marginal macrosetae; disc asetose, gold pruinose. Pleura brown-orange with darker red-brown patches, gold pruinose; katatergite with *ca.* 13 scattered yellowish setae. Wing: 7.7 x 2.8 mm; cell m_3 and cup open; membrane unstained, transparent; microtrichia absent except at tip and along margins. Halter: Yellow-brown. Legs: Uniform brown-yellow, tarsi slightly darker; setae yellow and dark red-brown, the latter mostly on tarsi.

Abdomen: Terga red-yellow, sterna brown-yellow, T1 red-brown anteriorly, T2–T7 with anterolateral dark red-brown spots, hind margins of T2 and T3 silver pruinose; macrosetae pale yellow, confined to lateral parts of T1.

Material examined: Type (OXUM): SOUTH YEMEN: 1 ♀ **holotype**, 'Type / v.d. Wulp / Trans. Ent. Soc. / 1899, page 83-4'; 'S. W. Arabia / 15 miles N. W. of / Aden, Lahej / Capt. Mar. 10.95 [1895] / & pres. 1899 by / J. W. Yerbury'; '1899 / 7689'; 'Type Dip: 180 / *Saropogon* / *rubriventris* / van der Wulp / Hope Dept. Oxford'.

Relationships: Wulp compared the species with *S. vestitus* Wiedemann, saying it differed only in the closed condition of the fourth posterior wing cell (i.e. m_3). Efflatoun (1937) states that both open and closed character states are found in *vestitus*, suggesting that *rubriventris* is probably a synonym of *vestitus*. The situation is further

complicated by the fact that the unique *rubriventris* holotype was collected at the same locality recorded for *incisuratus*, although 18 days earlier. It is, therefore, possible that this female may be that of *incisuratus*, which is known only on males. If this is true, *incisuratus* demonstrates far greater sexual dimorphism than appears to be found in any other species known to me. Sexual dimorphism may, however, also occur in *vestitus*, as this species is also known only on females (*Note*: Theodor (1980) mentions the possibility that *S. aegyptius* may represent the male). Yet another possibility exists, and that is that *jugulum* (Loew, 1847) could be the male of *rubriventris* (? = *vestitus*) as Efflatoun (1937) reports numerous males having been obtained at many localities at which *vestitus* females were found. Quite clearly these issues need to be resolved before taxonomic stability can be achieved. For the present I retain the status quo for the afrotropical taxa, pending modern revision of the palaearctic fauna.

***Saropogon zinidi* sp. n.**

Figs 28–32

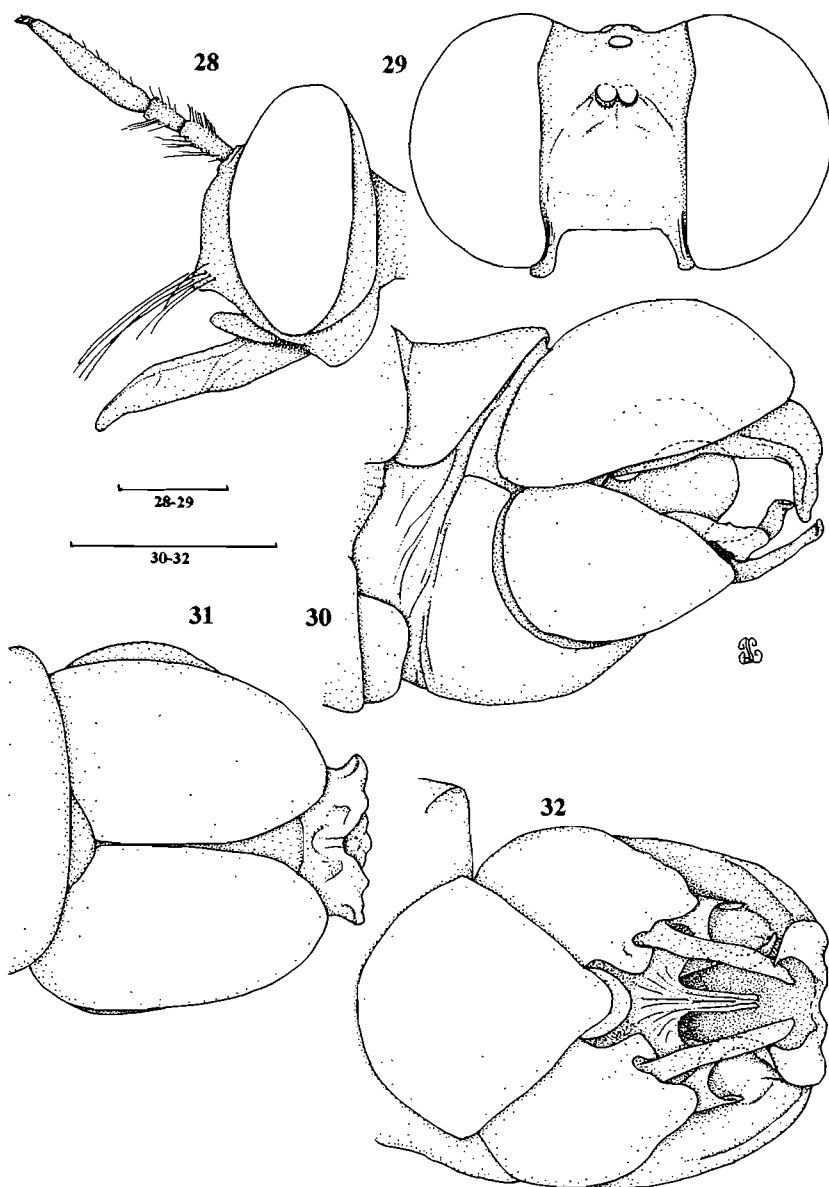
Etymology: Named for Dr I. M. I. Abu-Zinid, whose collecting activities in Kenya aided in the discovery of this species.

Description: Based on holotype ♂.

Head (Figs 28–29): Entirely dark red-brown to black, strongly silver pruinose except for a transverse band across vertex, including most of ocellarium, which is shiny apruinose. Setae of frons, vertex and occiput black and white. Antenna black; setae dark red-brown to black; proportional lengths of segments – 1 : 0.7 : 2.5 : 0.3; microsegment with pit-enclosed seta present. Width of eye : width of face ratio 1 : 1 (i.e. face as wide as eye). Mystax yellow-white; composed of *ca.* 30 setae arranged in 2 rows along lower facial margin. Palpus dark brown to black. Proboscis dark red-brown to black, slightly downcurved distally.

Thorax: Mesonotum dark red-brown to black, postalar lobes slightly paler; strongly silver pruinose. Macrosetae black and yellow: 2 npl (black and yellow); 2 yellow spal; 2 yellow pal; *ca.* 3 pairs black dc postsuturally; pronotal lobes equipped with 2 macrosetae (black and yellow). Scutellum dark red-brown to black, 2 black marginal macrosetae; disc asetose, silver pruinose. Pleura dark red-brown to black, gold-silver pruinose; katatergite with *ca.* 15 scattered yellow-white setae. Wing: 9.2 x 3.2 mm; cell *m*₃ closed and stalked, cup closed on or just before wing margin; membrane yellow stained along anterior margin and main veins, otherwise transparent; microtrichia confined to margins of major veins, wing margins and tip (wings have a brownish striped appearance). Halter: Dark-brown. Legs: Femora and tibiae orange (tibiae with dark red-brown distal ends), tarsi dark red-brown to black; most macrosetae black, but a few yellow.

Abdomen: T1–3 dark red-brown to black, T4 patchy red-brown and orange, T5 and beyond orange; macrosetae pale yellow, confined to lateral parts of T1; most small setae black except on terminalia where many are yellow. Genitalia (Figs 30–32): rotated *ca.* 90°; proctiger well developed and downwardly directed distally; hypandrium tapering to a rounded point distally and with a poorly-developed



Figs 28–32. *Saropogon zinidi* sp. n. paratype ♂ (Nguruma). 28–29. Head. 28. Lateral. 29. Anterior. 30–32. ♂ genitalia. 30. Lateral. 31. Dorsal. 32. Ventral. Scale lines equal 1 mm.

membranous, distal lobe (Fig. 32); phallus moderately developed with wing-like projections laterally (Fig. 30).

Variation: Topotypic paratypes remarkably consistent with holotype, other material demonstrating minor differences. Tanzanian ♂ abdomen appears to be entirely dark

red-brown, but it is extensively covered with fungal hyphae.

Material examined: KENYA: 1 ♂ **holotype**, 1 ♂ 2 ♀ **paratypes**, 'Kenya #59 / Nguruma, Kajiado dist / 01°50'S:36°56'E 700m / iv.1990, Rift valley / Coll: I.M.I. Abu-Zinid / Alluvial plains' (NMSA); 1 ♀ **paratype**, 'Brit. E. Africa, / Masai Reserve [? Masai Mara Game Reserve – 1°25'S:34°55'E] / 14.4.1914 / T. J. Anderson.'; 'Imp Inst / Entom'; 'S W Bromley / Collection / 1955' (BMNH); 1 ♂ **paratype**, 'Kenya: Archers's Post [0°39'N:37°41'E] / Uaso Nyiro river. / 2300' 6.xii.1969 / M. E. Irwin & / E. S. Ross' (CASC). TANZANIA: 1 ♂ **paratype**, 'Tanzania / 15 miles S. of / Longido [2°44'S:36°39'E] 30.iv.66 / D & A Greathead' (BMNH).

UNKNOWN COUNTRY: 2 ♀ 1 ? **paratypes**, 'Olgasalic [?] / May, 1944 / Meneghetti' (NMKE).

Relationships: A distinctive species. The male genitalia have some features in common with *greatheadi* (e.g. the wing-like flanges of the phallus).

Saropogon sp.

I have studied a single unidentifiable female, in perfect condition, collected by Robert Lavigne, labelled 'Somalia / Warable [2°55'N:43°49'E] / vi-7-87 / unknown / 102', housed at NMSA. This specimen appears to belong to an undescribed species near *zinidi*. The obvious differences are that the mystax is entirely black, as are most of the other head setae, and the abdomen is entirely black except for the terminalia which are yellow-brown. The thorax is also blackish with black setae. The mesonotum is strongly gold pruinose except for silver pruinose lateral parts. Most of the head is blackish although the ground colour of the face, which is masked by golden pruinescence, may be brownish. I am unwilling to describe the species on a single female and so merely note its interesting appearance and locality.

DISCUSSION

An analysis of palaearctic *Saropogon* listings by Lehr (1988) demonstrates that of the 26 species listed as occurring in North African countries (Morocco, Algeria, Tunisia, Libya and Egypt) only three are also recorded from the afrotropics. *S. elbaiensis* and *vestitus*, both recorded from Libya and Egypt, are listed as occurring

TABLE 1
Seasonal incidence of afrotropical *Saropogon* species.
(• = Identified specimens; + = Literature record only; * = Uncertain identification).

Species	J	F	M	A	M	J	J	A	S	O	N	D
<i>elbaiensis</i>	–	–	–	–	+	*	–	–	–	–	–	–
<i>greatheadi</i>	–	–	–	•	–	–	–	•	–	–	–	–
<i>incisuratus</i>	–	•	–	–	–	–	–	–	–	–	–	–
<i>kenyensis</i>	–	•	–	–	–	•	–	–	–	–	–	•
<i>melampyus</i>	–	•	•	•	–	•	–	•	•	•	•	–
<i>pulverulentus</i>	–	–	–	•	–	–	–	–	•	•	•	•
<i>rubriventris</i>	–	–	•	–	–	–	–	–	–	–	–	–
<i>zinidi</i>	–	–	–	•	•	–	–	–	–	–	–	•
Undescribed	–	–	–	–	–	•	–	–	–	–	–	–

in Sudan, very close to the Egyptian border. *S. melampygyus*, listed from Morocco and Egypt, is recorded from Ethiopia, Niger and South Yemen. It appears, therefore, that with the exception of *melampygyus*, North African species do not extend into afrotropical Africa. If the catalogued Asian records are studied it will be seen that 30 species are recorded. Of these 28 occur in the Near East (Iran, Iraq, Israel, Jordan, Lebanon, Syria & Turkey), the other two being recorded from Mongolia and China. Excluding the species recorded from South Yemen there are no records of species from the Arabian peninsula. This implies that Asian species do not penetrate into the afrotropics. This evidence suggests that the afrotropical species dealt with in this paper are distinct from both North African and Asian taxa. Apart from *melampygyus* the possible exceptions are those species known only from the interface between palaearctic and afrotropical countries (i.e. *elbaiensis*, *vestitus*, *incisuratus*, *rubriventris* and *pulverulentus*). Far more detail on the actual distributions of these taxa is needed before it can be established which are to be considered primarily afrotropical or palaearctic.

With the descriptions of three new species of *Saropogon* in this paper, and the record of another undescribed species from Somalia, it is now certain that there are at least a few species unique to the Afrotropical Region. Evidence suggests that they are associated with dry savanna situations.

TABLE 2
Summary of distribution of afrotropical *Saropogon* species.
(* = possible locality record).

Species	Senegal	Mauritania	Mali	Niger	Sudan	Eritrea	South Yemen	Kenya	Tanzania	Somalia	North Africa	Asia
<i>elbaiensis</i>	-	-	-	-	•	-	-	*	-	-	-	-
<i>greateadi</i>	-	-	-	-	-	•	-	-	-	-	-	-
<i>incisuratus</i>	-	-	-	-	-	-	•	-	-	-	-	-
<i>kenyensis</i>	-	-	-	-	-	-	-	•	-	-	-	-
<i>melampygyus</i>	•	•	•	•	•	•	•	-	-	-	•	•
<i>pulverulentus</i>	-	-	-	-	-	•	•	-	-	-	-	•
<i>rubriventris</i>	-	-	-	-	-	-	•	-	-	-	-	-
<i>zinidi</i>	-	-	-	-	-	-	-	•	•	-	-	-
Undescribed	-	-	-	-	-	-	-	-	-	•	-	-

The seasonal incidence of adult activity is summarised in Table 1, while the distributions of all confirmed afrotropical species is summarised in Table 2. While *S. melampygyus* may be active for much of the year, seasonal data are too limited to indicate clearly defined seasonal activity for any of the species. Similarly, *S. melampygyus* appears to have a very wide distribution, while data for the other species suggest that they are much more localised. Far more material needs to be obtained before the distributions of the taxa can be fully appreciated.

ACKNOWLEDGEMENTS

I wish to thank all the curators who sent me material for study. Thanks are also extended to the following for assistance rendered: Dr David Greathead who kindly provided me with interesting information about the localities at which he collected material; Dr I. M. I. Abu-Zinid who donated valuable Kenyan material to the Natal Museum; Drs David Barraclough and Michelle Hamer, who kindly read and commented on the manuscript. The Foundation for Research Development provided financial assistance in support of my research on afrotropical Asilidae.

REFERENCES

- DANIELS, G. 1989. Family Asilidae. In: Evenhuis, N. L., ed., *Catalog of the Diptera of the Australasian and Oceanian Regions*. Honolulu: Bishop Museum Press pp. 326–349.
- EFFLATOUN, H. C. 1937. A monograph of Egyptian Diptera. Part V. Family Asilidae (Section II). *Mémoires de la Société Royal Entomologique D’Egypte* **4** (3): 199–443, 5 colour plates.
- HULL, F. M. 1962. Robber flies of the World. The genera of the family Asilidae. *Bulletin of the United States National Museum* **224** (1): 1–430, (2): 431–907.
- LEHR, P. A. 1988. Family Asilidae. In: Soos, A. & Papp, L., eds., *Catalogue of Palearctic Diptera*. Amsterdam: Elsevier. **5**: 197–326.
- LOEW, H. 1851. Bemerkungen über die Familie der Asiliden. *Programm K. Realschule zu Meseritz* **1851**: 1–22.
- LONDT, J. G. H. 1980. Afrotropical Asilidae (Diptera) 4. The genus *Pegesimallus* Loew, 1858 (= *Lagodias* Loew, 1858; *Neolaparus* Williston, 1889) including species from other zoogeographical regions and the descriptions of two new genera *Brevirostrum* and *Caroncoma*. *Annals of the Natal Museum* **24** (1): 233–347.
- MARTIN, C. H. & PAPAVERO, N. 1970. *A catalogue of the Diptera of the Americas south of the United States*. São Paulo: Museu de Zoologia, Universidade de São Paulo. **35b**: 1–139.
- MARTIN, C. H. & WILCOX, J. 1965. Asilidae. In: Stone, A. et al., eds., *A catalog of the Diptera of America north of Mexico*. United States Department of Agriculture, Washington D. C. pp. 360–401.
- MCALPINE, J. F. 1981. Morphology and terminology – Adults. In: McAlpine, J. F. et al. *Manual of Nearctic Diptera*. Volume 1. Hull (Quebec): Agriculture Canada, Research Branch. (Monograph; No. 27) pp. 9–63.
- OLDROYD, H. 1963. The Tribes and Genera of the African Asilidae (Diptera). *Stuttgarter Beiträge zur Naturkunde* **107**: 1–16.
- 1975. Family Asilidae. In: Delfinado, M. D. & Hardy, D. E., eds., *A catalog of the Diptera of the Oriental region*. **2**. Honolulu pp. 99–156.
- 1980. Family Asilidae. In: Crosskey, R. W., ed., *Catalogue of the Diptera of the Afrotropical Region*. London: British Museum (Natural History) pp. 334–373.
- THEODOR O. 1980. *Diptera: Asilidae. Fauna Palaestina, Insecta II* Jerusalem: The Israel Academy of Sciences and Humanities.
- WULP, F. M. VAN DER 1899. Asilidae from Aden and its neighbourhood. *Transactions of the Entomological Society of London* **1899**: 81–98.

Date received: 6 August 1996